

Orenco® Sewers



Cost-Effective, Environmentally Sound Wastewater Collection System

IDEAL FOR COMMUNITIES OF ALL SIZES

- New subdivisions
- Neighborhood clusters
- Commercial properties
- Sewer expansions
- Septic tank abatement
- Ecologically sensitive areas
- Challenging site conditions



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Orenco® Sewers

Choose the Superior Wastewater Solution:

Orenco Effluent Only Sewers

Communities and developers throughout the world are struggling with wastewater collection and treatment issues. For many areas, conventional gravity sewer systems are too costly. Moreover, conventional sewers are not watertight, so their overflows contaminate our rivers, bays, and oceans.

"Given the diversity of the new technology that is now being developed, it is reasonable to speculate that, in the future, the continued use of conventional gravity flow systems will be a thing of the past."

Dr. George Tchobanoglous, UC Davis, Author of *Wastewater Engineering: Treatment, Disposal, Reuse and Small and Decentralized Wastewater Management Systems*

"Managed decentralized wastewater systems ... merit serious consideration in any evaluation of wastewater management options for small and mid-sized communities and new development."

EPA, *Response to Congress on Use of Decentralized Wastewater Systems*, April 1997

Watertight effluent sewer systems are becoming recognized as one of the best solutions for collecting waste and transporting it to a treatment facility.

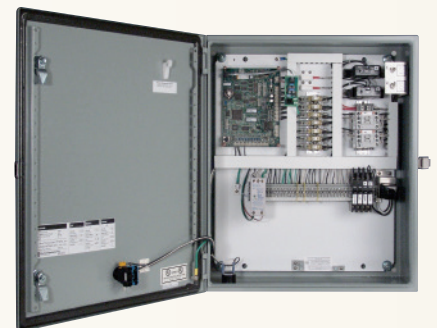
Orenco has helped hundreds of communities throughout the world to design, build, and maintain low-cost, watertight, reliable effluent sewers. Depending on terrain, effluent sewers are often half the cost of conventional sewers, or less.¹

Orenco (effluent only) sewers are compatible with existing wastewater infrastructure. They take the burden off maxed-out municipal systems and allow sustainable service area expansion. For monitoring and control, Orenco offers telemetry panels that provide the power of SCADA at an affordable price.



There are other alternative sewer technologies – grinder systems, for example. However, because the effluent from an Orenco Sewer is relatively free of grease, oil, and solids, the pumps and collection lines require less maintenance than grinder systems. And the high-quality filtered effluent from an Orenco Sewer requires less costly treatment.

For all these reasons, communities that purchase our effluent sewers enjoy system-wide, long-term savings.



system-wide long-term savings

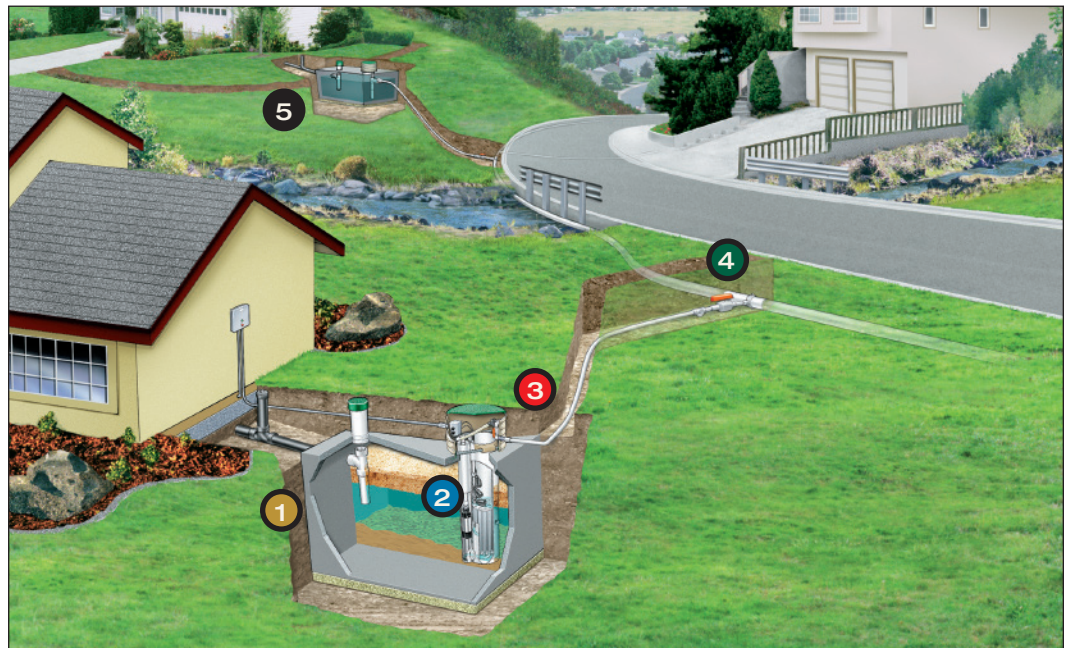
¹ Water Environment Research Foundation Fact Sheet C1 (Gravity Sewer Systems) and Fact Sheet C3 (Effluent Sewer Systems), 2010.

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How an Orenco Sewer Works

With an Orenco Sewer, raw sewage flows from the house or business to an underground tank, where it is pretreated. Only the filtered liquid is discharged (by either pump or gravity) through the service lines to shallow, small-diameter collection lines that follow the contour of the land. Solids remain in the underground tank for passive, natural treatment. Tanks typically need pumping only once every 10-12 years, depending on the number of users.²

Orenco Sewers are designed as a totally integrated package, and system components are compatible and preassembled. Each item is covered by a limited warranty and components are corrosion-resistant, durable, and lightweight.



1 Underground tanks provide primary treatment, so only liquids are conveyed to the treatment plant.

2 Our patented Biotube® Pump Vault filters out solids and our lightweight, non-corroding pumps last more than 25 years.³

3 One-inch (25-mm) diameter service lines can be easily installed with a trencher.

4 Small-diameter main lines follow the contour of the ground, saving on excavation costs. No expensive manholes or lift stations are required.

5 Filtered effluent is conveyed by gravity from homes at higher elevations, so no pump is typically required.



From Sewer to Treatment

The high-quality, filtered effluent from an effluent sewer is ideal for use with a low-cost, low-maintenance treatment system, such as Orenco's Advantex® AX100 textile filter. From there, it can be used for irrigation, toilet flushing, or other kinds of beneficial reuse (subject to local regulations). Without infiltration or solids to contend with, the size of the treatment plant can be substantially reduced. This saves money on equipment, installation, and operation costs.

This photo shows Phase 1 and 2 of Orenco's modular Advantex AX100 Wastewater Treatment System, located in Bethel Heights, Arkansas. Bethel Heights now has 45 AX100 filter modules that are designed to handle 225,000 gpd (850 m³/day) of wastewater. Multiple Orenco telemetry panels control the small, low-energy pumps that move wastewater through the filters and out to drip irrigation fields.

² Terry R. Bounds, PE. 1995. "Septic Tank Septage Pumping Intervals." Sutherlin, Oregon: Orenco Systems, Inc., 13.

³ Elkton, Oregon.

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A Fraction of the Cost of Conventional Sewers

Orenco Sewers dramatically reduce short-term and long-term wastewater treatment costs for communities and developers. In fact, effluent sewers are often one-half the cost of conventional gravity sewers or less. Here are the many ways you save:

Save On Equipment And Labor

- Collection lines are shallowly buried, just below the frost line, reducing excavation costs.
- Inexpensive, small-diameter collection lines are used.
- Expensive manholes and lift stations are eliminated.
- Installation time is reduced by one-half or more, compared to conventional sewers.⁴

- Ease of installation causes less disruption to communities, allowing businesses to operate normally during construction.
- Ease of installation makes the system well-suited for community “self-help” programs.
- Most equipment isn’t purchased until lots are developed, deferring costs.

Save On Operation And Maintenance

- Low maintenance requirements have been documented with Orenco Sewers.⁵
- 24-hour back-up storage in on-lot tanks reduces emergency calls and overtime costs.
- Homeowners pay about \$1.50/month in energy costs for pumps.⁶
- Residential tanks typically need pumping just once every 10-12 years, depending on the number of residents.⁷

Save On Treatment Costs

- Because of high effluent quality, low-cost treatment systems – such as packed-bed filters and sub-surface disposal – are ideal.
- Less costly permitting and testing are required when not discharging into waterways.
- Treatment facilities can be sized economically, since the whole system is designed to be watertight. There’s no need to allow for the infiltration and inflow from high stormwater flows or groundwater.



Orenco Sewer Systems are ideal for new subdivisions, whether on flat ground or on the most difficult terrain.

"In general, alternative collection systems should be considered for smaller rural communities with low population density and site specific environmental conditions . . . Shallow bedrock, high groundwater conditions, extremely flat or very hilly terrain and limited room for construction make alternative collection systems more cost-effective than conventional systems."

Illinois Community Action Association
Alternative Wastewater Systems in Illinois

⁴ Vero Beach, Florida.

⁵ Bill Cagle, Terry Cargil, and Roger Dickinson. 2013. "20-Year Life Cycle Analysis of an Effluent Sewer (STEP) System." *Proceedings of the Water Environment Federation Technical Exhibition and Conference*, Chicago, Illinois, October 5-9. Alexandria: Water Environment Federation, 14.

⁶ Run Time = 20 min/day, VAC = 115, A = 12.7, National Average Power Cost = \$0.1/kWh.

⁷ Terry R. Bounds, PE. 1995. "Septic Tank Septage Pumping Intervals." Sutherland, Oregon: Orenco Systems, Inc., 13.

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Community Case Studies

Hundreds of communities throughout North America are successfully collecting and treating their wastewater with Orenco Sewer Systems. For more detailed case studies, go to www.orencosystems.com/systems and click on "Markets."

Diamond Lake, Washington

In 1986–87, an Orenco Sewer system serving 500 homes was installed in this Washington lakeside community. Half the properties are seasonally occupied, with sudden start-ups and prolonged shut-downs. And the winters are very cold. Even so, operator Larry Garwood said, "The systems are simple, dependable, and easy to maintain."

Lacey, Washington

Lacey, Washington, was an early adopter of Orenco Sewer. The community's first effluent sewer mains were installed in 1986. Orenco staff worked closely with the city to design an effective maintenance schedule that would provide residents with a sustainable and affordable level of service. "We truly appreciate the effort that Orenco has made in doing what they can to reduce our costs and effort," said Terry Cargil, City of Lacey Water and Wastewater Supervisor. The city now has over 3,200 Orenco Sewer connections and almost 50 miles of small-diameter effluent sewer mains.

Elkton, Oregon

In 1989, an Orenco Sewer system was installed to serve more than 100 homes and businesses in Elkton, Oregon, at an average cost of less than \$7,000 per home for both collection and treatment. Ten years after installation, maintenance on the entire collection system averaged less than one hour per month, and not a single residential septic tank needed pumping.

Steamboat, Oregon

In 1999, an Orenco Sewer, followed by an innovative textile filter treatment system, was installed in Steamboat, Oregon, to replace a leaking gravity system along a wild and scenic river. Annual operating costs have been reduced by 72%!⁸

Mobile, Alabama

In the 1990's, South Alabama Utilities realized they needed to provide wastewater services to new subdivisions or risk losing customer share. Since then, SAU has installed Orenco Sewer systems serving 47 subdivisions. When all the developments are built out, SAU's collection systems will handle more than 2,000 homes.



SW Barry County, Michigan

To preserve water quality, this Michigan lake county has had an effluent sewer system since 1993. The system includes more than 1200 Orenco units. Orenco's units have worked so dependably that hundreds more have since been ordered.

"Progressive AE has been designing and observing the installation of STEP systems for small Michigan communities for over 15 years. And we've used the Orenco Systems STEP unit exclusively for more than 10 years."

William J. Parker, P.E.
Progressive AE

⁸ Interview with Jim Van Loan, owner of the Steamboat Inn, April 20, 2000.

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Frequently Asked Questions

Effluent Sewer Systems have been in use for several decades. During that time, the technology has improved so dramatically that effluent sewers are highly recommended by the U.S. Environmental Protection Agency, as well as by engineers, academics, and public agencies.



Who takes care of the system?

The community or a utility will own the system and provide centralized maintenance. Orenco's VeriComm® Monitoring System can provide automated, round-the-clock, computerized supervision. Orenco provides training for system operators and engineers.

Will there be lots of service personnel on people's property?

Service time per home is minimal. Utility meter readers come by far more frequently.

Do pumps have to be repaired or replaced frequently?

No. With normal maintenance and cleaning, our pumps last more than 25 years.⁹ Plus, the electricity to run them averages about \$1.50 per month.¹⁰

Will the system smell bad?

No. Not if properly designed and installed. Any wastewater collection system will smell if not properly designed and installed.

I've heard stories about these systems failing. Are they true?

Orenco Effluent Sewers work well. Solid engineering, proper equipment, and attention to detail ensure that. With any type of sewer system, poor engineering, substandard equipment, or sloppy installation can cause problems. Orenco Effluent Sewers have a well-documented track record of success.

Is the underground tank hard to take care of?

No. We require watertight tanks, and most need pumping only once every 10–12 years.¹¹ Otherwise, they're underground, out of sight and out of mind.

What happens to the solids that accumulate in the tank?

Accumulation of solids occurs slowly because of the digestion process that takes place in a watertight tank. In fact, the tank digests more than 80% of the biosolids.¹² Remaining solids are easily managed through planned pumping schedules

What if something goes wrong with my tank?

Each property has a control panel with an alarm function. Your system's operator will be automatically notified of any alarms. And the 24-hour reserve space in your tank gives the operator time to have a problem checked.

If I have more questions, whom can I call?

Call Orenco at ...
541-459-4449 or toll-free at
800-348-9843.

⁹ Elkton, Oregon.

¹⁰ Run Time = 20 min/day, VAC = 115, A = 12.7, National Average Power Cost = \$0.1/kWh.

¹¹ Terry R. Bounds, PE. 1995. "Septic Tank Septage Pumping Intervals." Sutherlin, Oregon: Orenco Systems, Inc., 13.

¹² H. Phillip, S. Maunoir, A. Rambaud, and L. S. Philippi. 1993. "Septic Tank Sludges: Accumulation Rate and Biochemical Characteristics." Proceedings of the Second International Specialized Conference on Design and Operation of Small Wastewater Treatment Plants; Trondheim, Norway.

Orenco® Sewers

Rely on Orenco for **System Support**

Orenco's innovative solutions to wastewater problems have become state-of-the-art. Our designs appear regularly in engineering textbooks and professional journals, and our engineers are invited to speak around the world. We routinely offer our expertise in the following ways:

Project Delivery

On the front end, Orenco offers design reviews for community systems. On the back end, we provide a variety of asset management services, including O&M protocols and recommendations to optimize financial performance.

Engineering and Technical Support

We can provide referrals to engineers who have successfully designed effluent sewers. And we offer a wide range of engineering and technical support services, from permitting assistance, plan reviews,

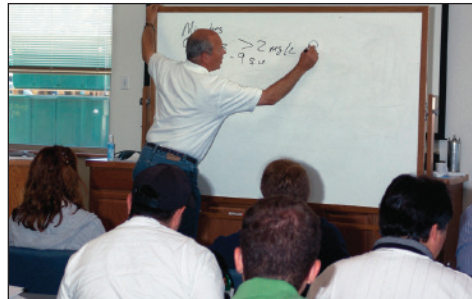
hydraulic analyses, and electronic drawings of products and systems. We also provide plan reviews, bid documents, material specifications, O&M support, and tech support for advanced controls, including telemetry and SCADA.

Training

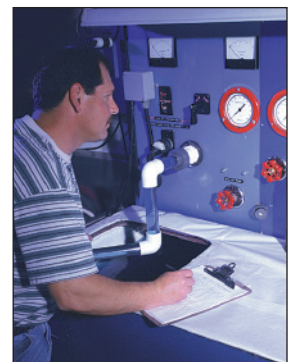
We offer installation and operation trainings at our headquarters in Oregon, U.S.A., at off-site locations, and via webinars.

Because our team of civil, environmental, mechanical, and electrical engineers work exclusively in the onsite and effluent sewer industries,

we're able to offer unmatched technical assistance. When you choose an Orenco system, you'll have the industry leader behind you.



We provide training at our Oregon headquarters and around the country.



Orenco maintains an environmental lab and invests heavily in research.

Our engineers offer unmatched technical assistance. Orenco's engineers and scientists have more than 500 years' experience in the water/wastewater industry.



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Orenco Systems is owned and managed by engineers who develop wastewater systems that work — systems based on sound science. From left to right: Eric Ball, P.E., Jeff Ball, P.E., Hal Ball, P.E., (front) Terry Bounds, P.E.

Defining Sustainable Solutions Since 1981

Orenco Systems has been re-searching, designing, manufacturing, and selling leading-edge products for wastewater treatment systems since 1981. The company has grown to become an industry leader, with about 300 employees and 300 points of distribution in North America, Australasia, Europe, Africa, and Southwest Asia. Our products and technologies have been installed in more than 70 countries around the world.



Orenco is headquartered at a 26-acre (10.5 ha) site in Oregon, a state that's known for its environmentally sustainable practices.

Orenco maintains an environmental lab and employs dozens of engineers, scientists, and wastewater treatment operators. Orenco's systems are based on sound scientific principles of chemistry, biology, mechanical structure, and hydraulics. As a result, our research appears in numerous publications and our engineers are regularly asked to give workshops and offer trainings.

Distributed by:



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